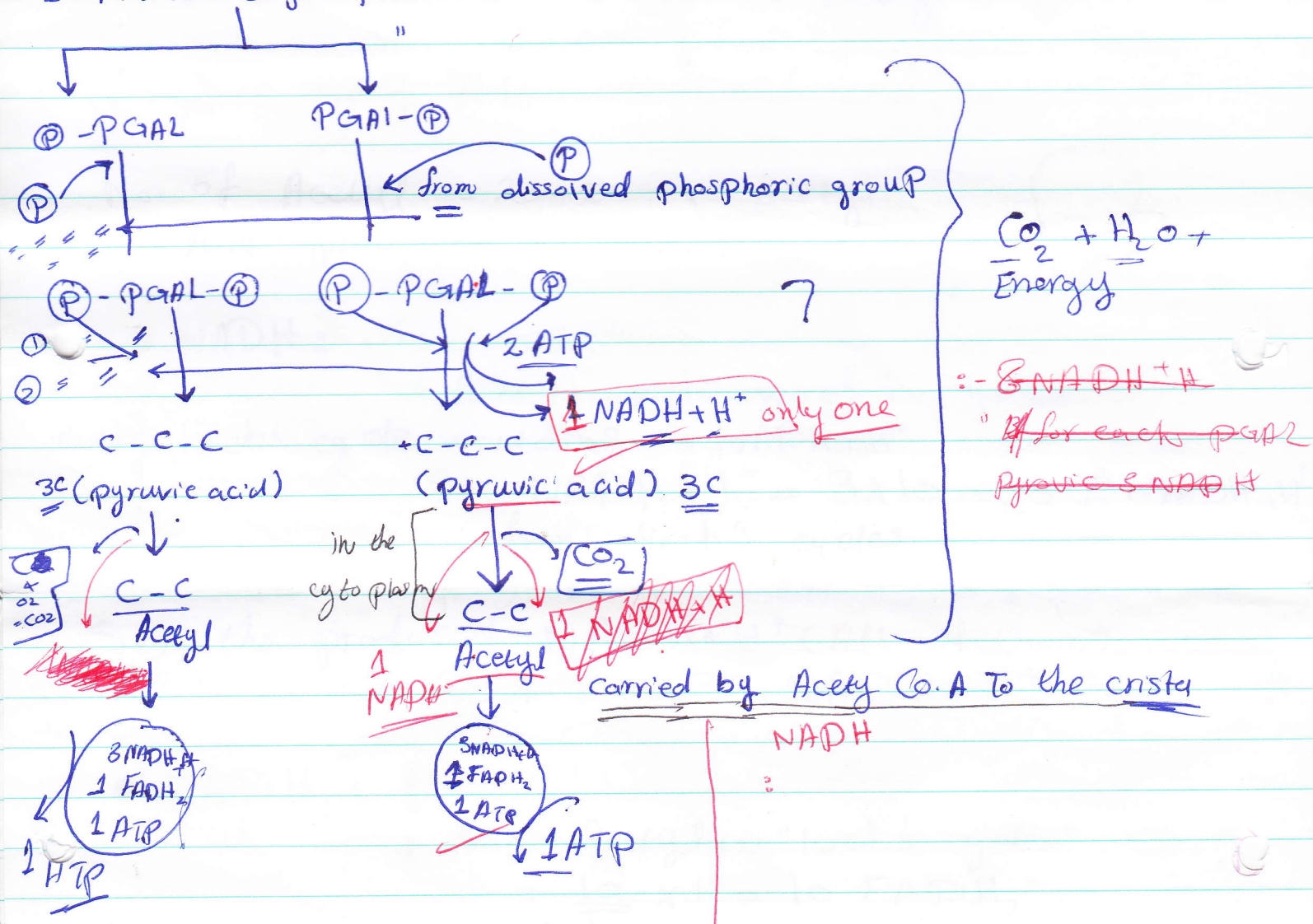
* In Glycolysis

- From Glucose $\xrightarrow{1ATP}$ Glucose-phosphate.
- Glucosephosphate $\xrightarrow{1ATP}$ Fructose diphosphate.
- Fructosediphosphat (6c)



So, the produced ATP in PGAL respiration?

① PGAL $\xrightarrow[2ATP]{}$ pyruvic Acid ② pyruvic acid $\xrightarrow[CO_2 \text{ only}]{}$ Acetyl

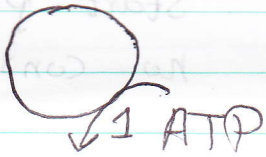
③ Acetyl inside Kreb's cycle $\xrightarrow{1ATP}$

So the produced energy is: 2 + 1 = 3 ATP

F.A Ex. 20C

- No. of Acetyl = No. of "C" ÷ 2
- No. of β-oxidation (s) = No. of Acetyl − 1
- * Q: How many ATP are produced?

No. of Acetyl = 20 ÷ 2 = 10 Acetyl.
∴ ATP produced = 10 ATP



- NADH: from acetyl:

10 Acetyl → 10 Kreb's cycles

every Kreb's cycle contains 3 $NADH+H^+$

So, $NADH+H^+ = 3 \times 10 = 30$ $NADH+H^+$ from Kreb's cycles

+ from β-oxidations = 9 $NADH+H^+$

So, the produced $NADH+H^+$ (All of them)

$= 30 + 9 = 39$ $NADH+H^+$

- $FADH_2$:

* from Acetyl (s) "Kreb's cycles"

$= \underset{\text{each cycle}}{\underline{10}} \times 1 = 10$ $FADH_2$

* from β-oxidations $= 1 \times 9 = 9$ $FADH_2$

- The produced $FADH_2 = 10 + 9 = 19$
- The produced ATP from $FADH_2 = 19 \times 2 = 38$ ATP

.. "Metabolism" ..

* Pyruvic acid is converted to Acetyl in the cytoplasm.
* Pyruvi acid (3C), when it converted to Acetyl (2C) it only loss one "C" and gives "CO_2"

* Counting "ATP produced" only when we start the respiration from the beggining "Giving Glucose 2 ATP", but we can't count the ATP produced if we "for ex" start pyruvic acid or PGAL resperation, because there's no consumed ATP in these steps.

* Converting Ketoglutaric acid (5c) to Succinic acid (4c) by losing ① C ⟶ CO_2 & producing : ATP direct formation.

, Because, the relased energy from "C-C" in the Ketoglutaric acid was sufficient (enough) to produce 1 ATP.

* Q: How many ATP are produced from PGAL respiration?

A : 3 ATP , Explanations:

PGAL

Ⓟ-C-C-C-Ⓟ

1 ATP

1 ATP

2 ATP

C-C-C ((pyruvic acid))

((First step))

C-C-C ⟶ C-C

"Pyruvic acid" "Acetyl"

Acetyl

C-C

Kreb's cycle

1 ATP

"Second Steps"

Produced ATP :

2+1 = 3 ATP.

Fatty acid (20C):

- In every β-oxidation we'll get 2C (Acetyl) + (Fatty acid − 2C) + 1 $FADH_2$ + 1 $NADH+H^+$.
- The fatty acid 'll enter the krebs cycle to produce 1 ATP + 3 $NADH+H$ + 1 $FADH_2$.

So:

No. of acetyl = No. of "C" ÷ 2

= 20 ÷ 2 = 10 "Acetyl molecules"

No. of β-oxidations = No. of acetyl − 1

= 10 − 1 = 9 β-oxidations

No. of $NADH+H^+$:

① from β-oxidations = No. of β-oxidations × 1

= 9 × 1 = 9

② from krebs cycle = No. of krebs cycle × 3

= 10 × 3 = 30

the produce $NADH+H^+$ = 30 + 9 = 39 $NADH+H^+$

No. of produced $FADH_2$:

① from β-oxidations = 9 × 1

= 9

② from krebs cycle = 10 × 1 = 10

the produced $FADH_2$ = 9 + 10 = 19 $FADH_2$

* ATP produced from $NADH+H^+$ = ② 39 × 3 → ①

= 117 ATP

* ATP produced from $FADH_2$ = ① 19 × 2 → ②

net gain = 117 + 38 + 10 = ~~170~~ 165 - 1 = 164

Total energy is counted for the 3 fatty acids

= 164 x 3 = 492 ATP